



## Power Switching Device

A NEW CONCEPT IN  
POWER SWITCHING  
OFFERS FASTER  
SWITCHING WITH  
REDUCED POWER  
LOSSES

**T**he photo below illustrates the MCT (MOS-Controlled Thyristor), a new type of power switching device for faster and more efficient control and management of power electronics. In this photo is a wafer of 130 MCTs which, if wired in parallel configuration would be able to control about one megawatt of power; a set of switches is shown in the adjacent photo. Manufactured by Harris Semiconductor, Melbourne, Florida, the MCT enables power electronic switching at frequencies of 50 to 100 thousand times a second with much lower power losses than typical of other semiconductor devices.

Harris Semiconductor describes the MCT as "a cost effective solution for high voltage, high-current applications where minimizing conduction losses in the power switch is critical." The MCT offers the

power handling capability of a near-ideal thyristor but it is controlled in turn-on/turn-off by a MOS transistor as a gating device. In addition to fewer induction losses and higher switching speed, MCT advantages include electric power savings, lighter weight, smaller space and fewer power losses, which combine to reduce operating costs.

The MCT is typically used in inverters, motor controllers and power controllers. An example of its effectiveness cited by Harris Semiconductor is its application in an electric car inverter evaluated by the Department of Energy and auto industry engineers; prototype MCTs used for power conversion allowed a significant increase in power efficiency in comparison with other thyristors and transistors. Other applications include switching power supplies, AC and DC motor

drives, pulse circuits and induction heating.

The MCT resulted from a long development effort that was supported in its early stages by Lewis Research Center. Interested in electroactivation as a replacement for hydraulic devices used in aircraft and space systems, Lewis awarded an initial development contract to General Electric Company. The development was further funded by a consortium of several government agencies, including NASA, and the Electric Power Research Institute. The development effort was conducted by Dr. Vic Temple and his associates at GE. Harris Semiconductor subsequently purchased GE's power semiconductor operation and Temple, along with his department, moved from GE to Harris. The MCT was introduced to the commercial market in 1992. ●

